

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (currently amended): A device for determining analyte concentrations within sample tissues, the device comprising:

an infrared radiation detector ~~assembly~~;

a infrared transmissive window in operative combination with said infrared radiation detector ~~assembly~~; and

a cooling element ~~means for inducing~~ configured to induce a temperature gradient in said sample tissues, said cooling element ~~means being~~ in operative combination with said window.

Claim 2 (currently amended): A device as in claim 1 further including said cooling element ~~means being~~ in operative combination with said window and a said heating element.

Claims 3–10 (canceled).

Claim 11 (currently amended): A device as in claim 1 wherein said cooling element ~~means for cooling~~ induces one of a time varying temperature gradient or a periodically time varying temperature gradient.

Claims 12–30 (canceled).

Claim 31 (currently amended): A device for determining analyte concentrations within sample tissue by measuring sample infrared spectral emissions, said device comprising:

an infrared transmissive window ~~assembly~~;

Amendment Dated 14 October 2003

a heating element ~~means~~ and a cooling element, ~~means~~ each being positioned for heating and cooling said sample tissue, respectively; and

an infrared radiation detector ~~assembly~~ positioned such that said infrared spectral emissions from said sample tissue pass through said infrared transmissive window ~~assembly~~ onto ~~a~~ the detector.

Claim 32 (currently amended): A device as in claim 31 wherein said heating element ~~means~~ is part of said infrared transmissive window ~~assembly~~.

Claims 33–37 (canceled).

Claim 38 (currently amended): A device for determining analyte concentrations within sample tissues by measuring sample infrared spectral emissions, said device comprising:

an infrared transmissive window ~~assembly~~;

~~a means for heating~~ element and a cooling element, each configured said sample tissues, ~~said means being positioned to~~ heat and cool said sample tissue, respectively; and

an infrared radiation detector ~~assembly~~ positioned such that said infrared spectral emissions from said sample tissue pass through said infrared transmissive window ~~assembly~~ onto ~~a~~ the detector.

Claim 39 (currently amended): A device as in claim 38 wherein said heating element and cooling element ~~are means~~ is part of said infrared transmissive window ~~assembly~~.

Claims 40–42 (canceled).

Claim 43 (original): A device as in claim 38, further comprising a signal processor for receiving and processing a signal from said detector.

Claim 44 (canceled).

Claim 45 (currently amended): A device for determining analyte concentrations within sample tissues, the device generating a thermal gradient in the tissue and measuring infrared spectra to make determinations of analyte concentration, the device comprising in operative combination:

 a layered window ~~assembly~~ having a plurality of infrared transmissive elements;

 a means for inducing a temperature gradient in said sample tissue, said means in operative combination with said window ~~assembly~~ and in thermal communication with said sample tissue; and

 an infrared radiation detector ~~assembly~~ in operative combination with said window.

Claim 46 (canceled).

Claim 47 (original): A device as in claim 45 wherein said means for inducing a temperature gradient includes an infrared transmissive heating element and a cooling element.

Claims 48–50 (canceled).

Claim 51 (currently amended): A device as in claim 47, wherein said plurality of infrared transmissive elements comprising said layered window ~~assembly~~ includes a thermally conductive spreader layer positioned between said sample tissue and said heating element.

Claim 52–64 (canceled).

Amendment Dated 14 October 2003

Claim 65 (currently amended): A device as in claim 45 further including a signal processing system for processing data received from said infrared radiation detector assembly.

Claims 66–71 (canceled).

Claim 72 (currently amended): A method for making a device for generating a thermal gradient in sample tissue and measuring infrared spectra to determine analyte concentrations in said sample, the method comprising ~~the steps of:~~

- providing a layered window ~~assembly~~ having a plurality of infrared transmissive elements;

- providing a means for inducing a temperature gradient, said means in operative combination with said window;

- providing an infrared radiation detector in operative combination with said window; and

- providing a signal processing system in operative combination with said radiation detector.

Claims 73–81 (canceled).

Claim 82 (new): A device for determining analyte concentrations within sample tissues, the device comprising:

- a window having an infrared transmissive heating element, an infrared transmissive cooling element, and an infrared transmissive thermal insulating element, the window configured to induce a temperature gradient in the sample tissues; and

- an infrared radiation detector configured to detect infrared radiation that has been emitted from the sample tissues and that has passed through the window.

Amendment Dated 14 October 2003

Claim 83 (new): A device as in claim 82 wherein said heating element comprises a heating grid.

Claim 84 (new): A device as in claim 82 wherein said cooling element is a thermal electric cooler.

Claim 85 (new): A device as in claim 82 wherein said cooling element further includes a heat sink.

Claim 86 (new): A device as in claim 85 wherein said heat sink further includes a phase change material.

Claim 87 (new): A device as in claim 82 wherein said infrared radiation detector includes an optical scrambler.

Claim 88 (new): The device of claim 82, further comprising a signal processing system for receiving and processing data from said infrared radiation detector.

Claim 89 (new): A device as in claim 82 wherein said infrared radiation detector includes a radiation detector selected from the group consisting of discrete infrared band-pass filters and detectors, an interferometer, a spectrophotometer, a grating monochromator, Fabry-Perot filters, room temperature micro-bolometers, and a variable filter monochromator.

Claim 90 (new): A device as in claim 82 wherein said infrared radiation detector comprises a plurality of infrared band-pass filters and detectors optimized for the detection of at least one specific analyte.

Claim 91 (new): A device as in claim 90 wherein said infrared radiation detector is optimized for the detection of glucose.

Claim 92 (new): A device as in claim 91 wherein said plurality of infrared bandpass filters include filters having bandpass wavelengths of about 9.3 μ m and 9.6 μ m.

Claim 93 (new): A device as in claim 91 wherein said plurality of infrared bandpass filters include filters having bandpass wavelengths in the range of about 8 μ m to 9 μ m and 10 μ m to 11 μ m.

Claim 94 (new): A device as in claim 90 wherein said plurality of infrared bandpass filters include filters optimized for the measurement of water, said filters having bandpass wavelengths in the range of about 5.9 μ m to 6.2 μ m and about 11.5 μ m to 13 μ m.

Claim 95 (new): A device as in claim 90 wherein said plurality of infrared bandpass filters include filters optimized for the measurement of water, said filters having bandpass wavelengths in the range of about 10 μ m to 11 μ m.

Claim 96 (new): A device as in claim 90 wherein said plurality of infrared bandpass filters include filters optimized for the measurement of proteins, said filters having bandpass wavelengths in the range of about 6.2 μ m to 6.6 μ m, 7.9 μ m to 8.1 μ m, 9.1 μ m to 9.4 μ m, and 9.4 μ m to 9.8 μ m.

Claim 97 (new): A device as in claim 90 wherein said plurality of infrared bandpass filters include filters optimized for the measurement of proteins, said filters having bandpass wavelengths in the range of about 8.2 μ m to 8.3 μ m.

Claim 98 (new): A device as in claim 90 wherein said plurality of infrared bandpass filters include filters optimized for the measurement of maximum tissue depth

Amendment Dated 14 October 2003

information, said filters having bandpass wavelengths in the range of about 5.0 μ m to 5.5 μ m.

Claim 99 (new): A device as in claim 90 wherein said plurality of infrared bandpass filters include filters centered at wavelengths of about 6.1 μ m, 6.9 μ m, 8.5 μ m, 9.3 μ m, 9.7 μ m, 10.4 μ m, 11.0 μ m, and 12.5 μ m.

Claim 100 (new): A device as in claim 82 wherein said heating element and cooling element induce one of a time varying temperature gradient or a periodically time varying temperature gradient.

Claim 101 (new): A device as in claim 82, wherein the heating element, the cooling element and the insulating element are disposed in the window in a layered configuration.

Claim 102 (new): A layered infrared transmissive window comprising:

- a first layer comprising an infrared transmissive heating element capable of inducing a temperature gradient in a sample tissue; and

- a second layer comprising an infrared transmissive thermal insulating material.

Claim 103 (new): The window of claim 102, further comprising:

- a spreader layer; and

- a base window.

Claim 104 (new): The window of claim 103, wherein said spreader layer is positioned adjacent to said heating element, the heating element positioned adjacent to said thermal insulating element, and said thermal insulating element positioned adjacent to said base window.

Amendment Dated 14 October 2003

Claim 105 (new): The window of claim 104, wherein said spreader layer includes a top surface having a protective layer, said protective layer being formed of an infrared transmissive material which enhances the energy transmission of said window and having high thermal conductivity and having a high mechanical wear resistance.

Claim 106 (new): The window of claim 105, wherein said base window includes a bottom surface having an overcoat layer.

Claim 107 (new): The window of claim 102, wherein said heating element and thermal insulating element induce one of a time varying temperature gradient or a periodically time vary temperature gradient.